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M-X ENVIRONMENTAL TECHNICAL REPORT

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This report was prepared from material developed by Frank K. Stuart and Associates, Salt Lake City, Utah, under contract to HDR Sciences, Santa Barbara, California. The report on the steel industry was prepared to provide baseline data and to develop a predictive model for price effects. The M-X project requirementsincorporated into the report represented the best data available at the time the work was performed. The baseline data and the predictive model are approximate for use with any revised set of project requirements data.

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1.0 BASELINE DATA ON THE STEEL INDUSTRY

The steel production system is comprised of several industries in addition to that of the steel mill itself. Mining industries supply the basic inputs of iron ore, coke, and limestone. From these raw materials, steel is produced and then often is passed on to yet another industry specializing in fabrication of particular steel products. In addition, the steel scrap processing industry collects and recycles discarded steel scrap.

Steel is made by two principal processes, hot and cold. The hot metal process produces new steel from ore and other raw materials. Raw materials are first processed in a blast furnace to produce molten iron. Molten iron as the major input is then combined with steel scrap in an additional refining process which results in the production of steel. There are two basic types of steelmaking furnaces used in the hot metal refinement process. The basic oxygen furnace (BOF) introduces nearly pure oxygen above the surface of the molten iron which rapidly refines the metal into steel. This process can use a maximum of 30 percent scrap in combination with molten iron. As a result, very little "purchased scrap" is used. The open hearth furnace, the mainstay of the industry before the mid-1960s, is completely flexible in combining molten iron and steel scrap. Despite the versatility of the open hearth, variations of the BOF are becoming ever more popular because of more rapid steelmaking processes which result in the use of less energy and lower operating and capital costs (Council on Wage and Price Stability, 1977).

A third type of furnace, the electric arc furnace, is most prevalently used in the cold metal steelmaking process. These furnaces may be used to refine molten iron but are used primarily for the reduction of scrap for reprocessing into steel mill shapes. Electric arc furnaces are often used by "minimills" to produce steel reinforcing bars from low grade automotive scrap. The cold metal process does not require a blast furnace, coke oven, and related facilities and therefore requires a much smaller capital investment per ton of raw steel output. This cost advantage makes it possible for the small producer to compete effectively in the steel market whenever the relative cost of the principal raw material, scrap steel, is below that of producing blast furnace hot metal.

A. The U.S. Steel Market

1. Prices. The production of steel has a major influence on the United States economy because of its widespread use as a basic material. Steel prices are a key factor in determining the overall price level. Because the steel industry is an oligopoly of relatively few sellers with respect to most products, prices have generally been administered through "price leadership." Since World War II, the predominant pattern has been for one or more of the major companies to set prices and for other companies to follow. If such a price is deemed excessive, other large producers will not follow with a full increase. This results in a shift of market shares or a rapid rollback in the initial price increase. Price goals have been determined as near as possible by the addition of a target rate of return to fully allocated production costs. The primary restraints on achieving these target price increases have been potential

loss of steel markets to imports and government opposition (Council on Wage and Price Stability, 1975). In recent years, this pricing structure, particularly in some products, has been less valid than previously because of an increase in highly efficient mini-mills producing mainly from steel scrap and increasing pressure from foreign producers seeking an outlet for their new or underutilizied steelmaking capacity. This is especially true with respect to less complex steel products such as concrete reinforcing bars.

2. Production Capacity. Consistent with its pricing structure and the industry's relationship with government, the steel industry seeks to justify its price increases. One prevalent argument is that a large expansion of domestic steel capacity is needed to meet future growth, that such an expansion will be very expensive, and that higher prices, cash flows, and profits will be needed to finance it.

There are at least four different series of capacity utilization ratios. These include ratios prepared by the Bureau of Economic Analysis, the Bureau of the Census, McGraw-Hill, and the Federal Reserve Board. The Federal Reserve Board index of iron and steel industry capacity, output, and ratios of capacity utilization are set forth in Table 1-1. Since World War II, steel capacity has increased 74 percent at an average annual rate of 1.6 percent. During the past 10 years, the rate of increase has decreased to 0.7 percent per year. During the same period, output has increased to 50 percent at an average annual rate of 1.3 percent. Since 1969 the average annual rate of increase in steel output has been less than 0.1 percent. Capacity utilization has declined from 93.4 percent in 1948 to 85.0 percent in 1979. Relatively large fluctuations in capacity utilization have resulted from the highly cyclical nature of the steel industry which sells the bulk of its production as construction materials and durable goods. Utilization reached a post World War II high of 100 percent in 1951 and a low of 63.7 percent during the recession of 1958. Weekly capacity utilization figures are much more volatile. The latest weekly report as of June 10, 1980 showed a utilization of 61.1 percent with some experts predicting a further decline to 50 percent by July 1980 (Wall Street Journal). During the past 10 years, average annual capacity utilization has been consistently higher than 80 percent with the exception of 1971, the year government price controls were imposed, and the recession year of 1975. The high point during this period occurred during 1973 when increased demand pressures coupled with the imposition of price controls pushed output to 98.1 percent. Demand for steel remained high during 1974 and some steel users were left without product or were forced to buy higher priced steel from small producers or foreign suppliers. Utilization dropped precipitously to 74.5 percent in 1975 as a result of the general economic recession.

These relatively volatile changes in capacity utilization both help explain the stability in price for the majority of steel mill products and can in turn be explained by the nature of steel prices. Steel producers have discovered that in the short term the demand for steel is income elastic and price inelastic. If producers maintain production at high

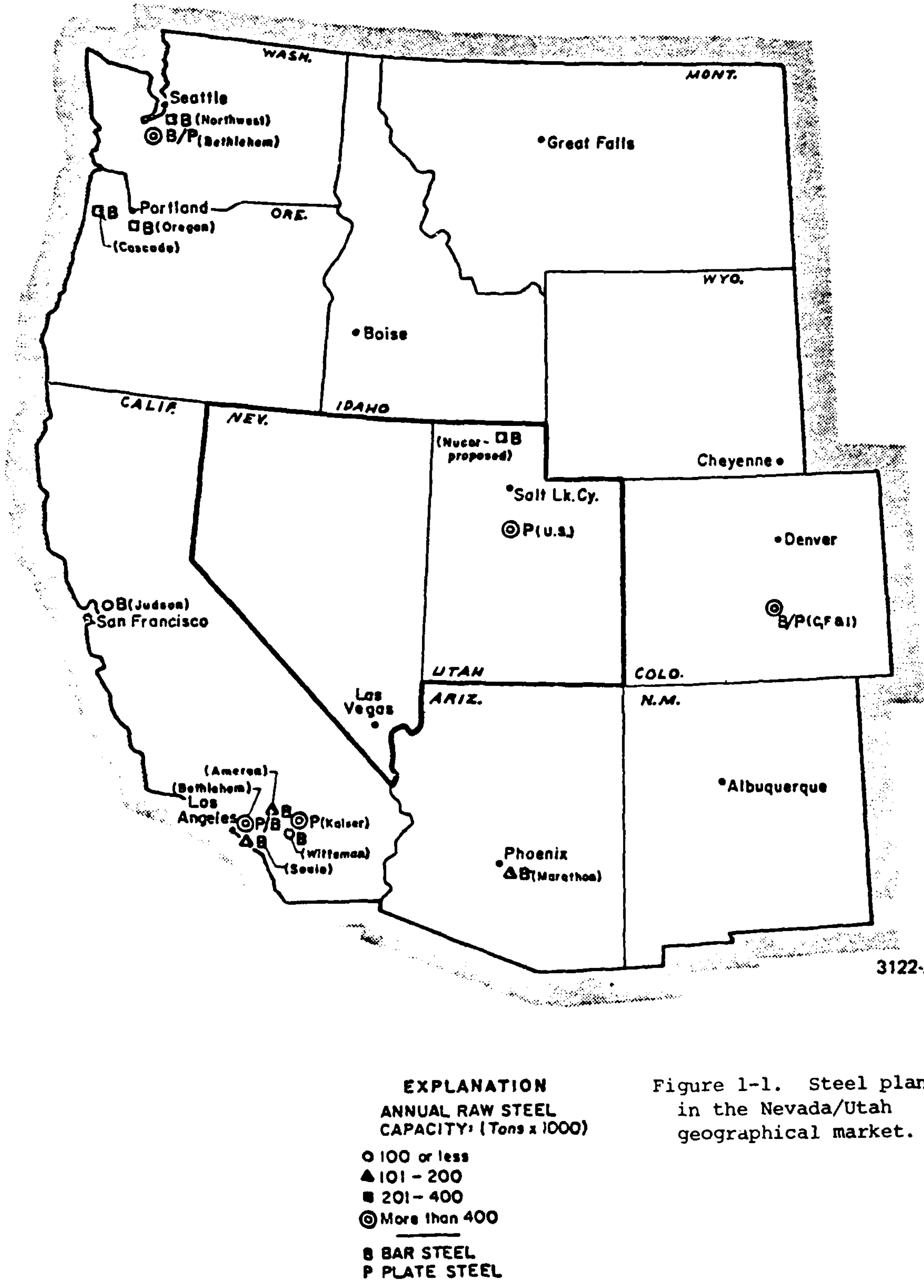

Figure 1-1. Steel plants in the Nevada/Utah geographical market.

Table 1-1. Iron and steel industrial capacity. 1948-1979

YEAR	CAPACITY	OUTPUT	CAPACITY UTILIZATION
	(1967 Output = 100)		(Percent) (2) ÷ (1)[1]
	(1)	(2)	(3)
1948	81.0	75.7	93.4%
1949	83.0	64.3	77.6
1950	85.7	79.8	93.0
1951	88.7	89.0	100.3
1952	91.5	77.4	84.6
1953	94.5	90.4	95.7
1954	97.0	70.2	72.4
1955	98.2	93.6	95.3
1956	99.7	90.6	90.9
1957	102.7	88.5	86.2
1958	105.5	67.3	63.7
1959	107.1	74.6	69.7
1960	107.7	77.1	71.6
1961	107.9	75.3	69.7
1962	108.1	77.0	71.2
1963	107.9	84.1	78.0
1964	108.6	96.1	88.5
1965	111.4	105.0	94.3
1966	115.4	108.5	94.0
1967	118.9	100.3	84.3
1968	12[illegible].9	102.9	84.5
1969	124.4	112.9	90.7
1970	125.3	104.7	83.6
1971	125.6	95.4	75.9
1972	125.1	107.2	85.7
1973	124.8	122.5	98.1
1974	126.5	119.9	94.7
1975	128.4	95.7	74.5
1976	130.0	105.0	80.8
1977	131.0	103.8	79.2
1978	131.7	113.2	85.9
1979	133.1	113.2	85.8

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[1]Utilization rates may vary slightly due to rounding.

Source: Federal Reserve Board.

levels during an economic downturn while reducing prices to clear the market, large revenue losses are the result. If on the other hand the price is maintained or even raised while production is adjusted to meet the change in demand, revenues are much higher and the potential for rapid recovery when conditions reverse is much more favorable (Council on Wage and Price Stability, 1975). When in recessions, the major mills have historically cut output rather than prices.

3. Consumption. The best measure of United States steel consumption is total shipments of steel mill products. This figure excludes foreign product and steel consumed by producing facilities. Table 1-2 sets forth the tonnage of steel reinforcing bars and steel plate shipments from 1969 through 1978. These two products are the principal steel forms expected to be used in the proposed construction of the M-X system. Other than during the 1975 and 1976 recession years, shipments of concrete reinforcing bars have averaged 4.0 million tons per year or approximately 85 percent of total United States consumption of rebars as measured by the Concrete Reinforcing Steel Institute (see Table 1-3). Shipments of steel plate have been more erratic than those of rebar going from 7.3 million tons in 1969 to 6.5 million in 1972, then to a high of 9.4 million tons in 1974. In 1975 shipments again fell reaching a low of 5.6 million tons in 1976. Again 1976 shipments gradually increased reaching a level of 6.6 million tons in 1978.

B. The Nevada/Utah And Texas/New Mexico Steel Markets

1. Production Capacity. A list of the principal steel producing facilities located in the 11 western states plus Texas and Oklahoma is set forth in Table 1-4. The location of those facilities which are in geographical proximity to the Nevada/Utah site is illustrated in Figure 1-1. Figure 1-2 sets forth the plants that may be used under the Texas/New Mexico proposal.

In order to determine the impact associated with the construction of the M-X system, we have examined the available supply of steel products in an area close enough to the project so that steel can be delivered at a reasonable freight rate. The following plants are within economic reach of the M-X system if it is constructed in Nevada and Utah.

a. Cascade Steel Rolling Mills, Inc. Cascade Steel is located at McMinnville, Oregon near Portland and has a current capacity to produce approximately 180,000 tons of raw steel. During the current year with planned improvements, the capacity will be expanded to 250,000 tons. With this additional tonnage, the plant will be able to produce 200,000 tons of rebar annually.

b. Northwest Steel Rolling Mills, Inc. Northwest Steel is located in Seattle, Washington and has a capacity to produce approximately 240,000 tons of raw steel annually. In terms of finished products, it will be able to turn out 180,000 tons of rebar.

Table 1-2. Selected steel product shipments and value per ton. 1969-1978

	SHIPMENTS[1]		VALUE (F.O.B. PLANT)		INDICATED VALUE		AVERAGE MILL PRICE[2]	
YEAR	CONCRETE REINFORCING BARS	STEEL PLATE[3]	CONCRETE REINFORCING BARS	STEEL PLATE[3]	CONCRETE REINFORCING BARS	STEEL PLATE[3]	CONCRETE REINFORCING BARS	STEEL PLATE[4]
	-----(Short Tons)-----		---(Thousand Dollars)---		------------(Dollars Per Ton)---------------			
					(3) ÷ (1)	(4) ÷ (2)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1969	4,473,501	7,255,364	$ 479,271	$1,095,177	$107.14	$150.95	$112.79	$134.82
1970	4,386,303	6,920,250	535,025	1,115,436	121.98	161.18	122.75	144.12
1971	4,232,220	6,817,956	539,948	1,158,208	127.58	169.88	134.86	161.45
1972	4,228,353	6,499,017	542,843	1,189,279	128.38	182.99	128.70	172.14
1973	4,971,050	7,842,813	722,467	1,522,066	145.33	194.07	139.44	179.10
1974	4,850,188	9,351,662	1,152,709	2,271,720	237.66	242.92	226.46	221.76
1975	2,852,731	7,111,872	654,112	2,011,343	229.29	282.81	223.91	260.32
1976	2,965,191	5,598,201	616,886	1,646,163	208.04	294.05	204.86	278.01
1977	3,458,286	5,981,011	694,632	1,925,711	200.86	321.97	208.22	303.47
1978	4,033,447	6,617,102	891,232	2,346,786	220.96	354.65	234.01	341.87

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[1] Does not include steel production consumed in producing plants for (1) Fabricated products or (2) maintenance, repair, and operating supplies.

[2] Average of monthly transaction prices (f.o.b. mill) reported by the U.S. Department of Labor, Statistics.

[3] Does not include floor plates.

[4] A-36 carbon steel plate.

Source: U.S. Department of Commerce, Current Industrial Reports.

Table 1-3. Domestic United States apparent use of rebars. 1966-1978

YEAR	APARTMENTS HOTELS, MOTELS	HEAVY CONSTRUCTION	PAVEMENT	BRIDGES, MISCELL-ANEOUS, HIGHWAY	PUBLIC BUILDINGS	INDEPENDENT AND COMMERCIAL BUILDINGS	OTHER USES	TOTAL
(Thousands of Tons)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1966	260.9	918,1	175.9	537.0	1,124.0	1,445.2	94.6	4,557.0
1967	195.2	1,088.8	214.0	602.7	1,085.5	1,338.7	88.3	4,613.0
1968	263.8	1,129.9	212.3	484.0	1,118.9	1,436.2	101.8	4,747.0
1969	310.2	1,284.0	289.0	656.3	821.7	1,553.2	85.7	5,000.0
1970	337.6	1,358.1	217.1	815.5	728.8	1,621.8	73.9	5,153.0
1971	333.7	1,384.5	236.4	922.9	878.8	1,494.3	75.5	5,126.0
1972	329.0	1,218.0	170.0	694.0	620.0	1,810.0	64.0	4,905.0
1973	450.0	1,355.0	196.0	484.0	713.0	2,044.0	94.0	5,336.0
1974	271.9	1,473.8	112.2	455.8	790.1	2.145.8	70.4	5,320.0
1975	275.5	1,204.1	92.2	374.0	644.9	1,151.1	58.2	3,800.0
1976	266.6	1,449.8	90.1	216.2	687.3	1,271.2	72.8	4,054.0
1977	209.4	1,598.0	88.1	225.7	652.5	1,396.1	90.2	4,260.0
1978	266.5	1,637.0	53.7	345.9	632.3	1,727.5	94.9	4,757.8

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Source: Concrete Reinforcing Steel Institute.

Table 1-4. Steel producers within the geographical areas of the proposed M-X missile system project.

LOCATION	PLANT	RAW STEEL CAPACITY	AVERAGE REBAR PRODUCTION	ESTIMATED REBAR PRODUCTION CAPACITY
		-(Tons)-	(Percent of Capacity)	--(Tons)--
(1)	(2)	(3)	(4)	(5)
California				
Etiwanda	Ameron, Inc.	160,000	NA	64,000
Los Angeles	Bethleham Steel Corp.	500,000	50	250,000
Emeryville	Judson Steel Corp.	120,000	95	110,000
Fontana	Kaiser Steel	3,300,000	0	0
Long Beach	Soule Steel Co.	120,000	60	75,000
Fontana	Witteman Steel Mills	42,000	100	42,000
Oregon				
McMinnville	Cascade Steel Rolling Mills, Inc.	250,000[1]	80	200,000
Portland	Oregon Steel Mills, Inc.	400,000	0	0
Washington				
Seattle	Bethlehem Steet Corp.	600,000	30	180,000
Seattle	Northwest Steel Rolling Mills, Inc.	240,000	75	180,000
Utah				
Plymouth	Nucor Steel (Proposed)	350,000	50	175,000
Orem	United State Steel Corp.	2,500,000	0	0
Arizona				
Tempe	Marathon Steel Co.	180,000	75	130,000
Colorado				
Pueblo	CF & I Steel Corp.	2,000,000	12	250,000
Texas				
Houston	Armco Steel Corp.	500,000	0	0
El Paso	Border Steel Rolling Mills, Inc.	180,000	40	72,000
Midlothian	Chaparrel Steel Co.	800,000+[1]	20	430,000
Beaumont	Georgetown Texas Steel Corp.	650,000	20	130,000
Longview	Marathon Le Tourneau Co.	100,000	0	0
Sequin	Structural Metals, Inc.	360,000[1]	40	150,000
Fort Worth	Texas Steel Co.	200,000	100	200,000
Baytown	United States Steel Corp.	1,500,000	0	0
Oklahoma				
Sand Springs	Armco Steel Corp.	310,000	83	257,000
Oklahoma City	Lofland Steel Mill, Inc.	12,000	100	12,000

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[1]Includes proposed capacity expansion.

Source: Iron And Steel Engineer, November 1975. Individual plant data obtained through personal contact.

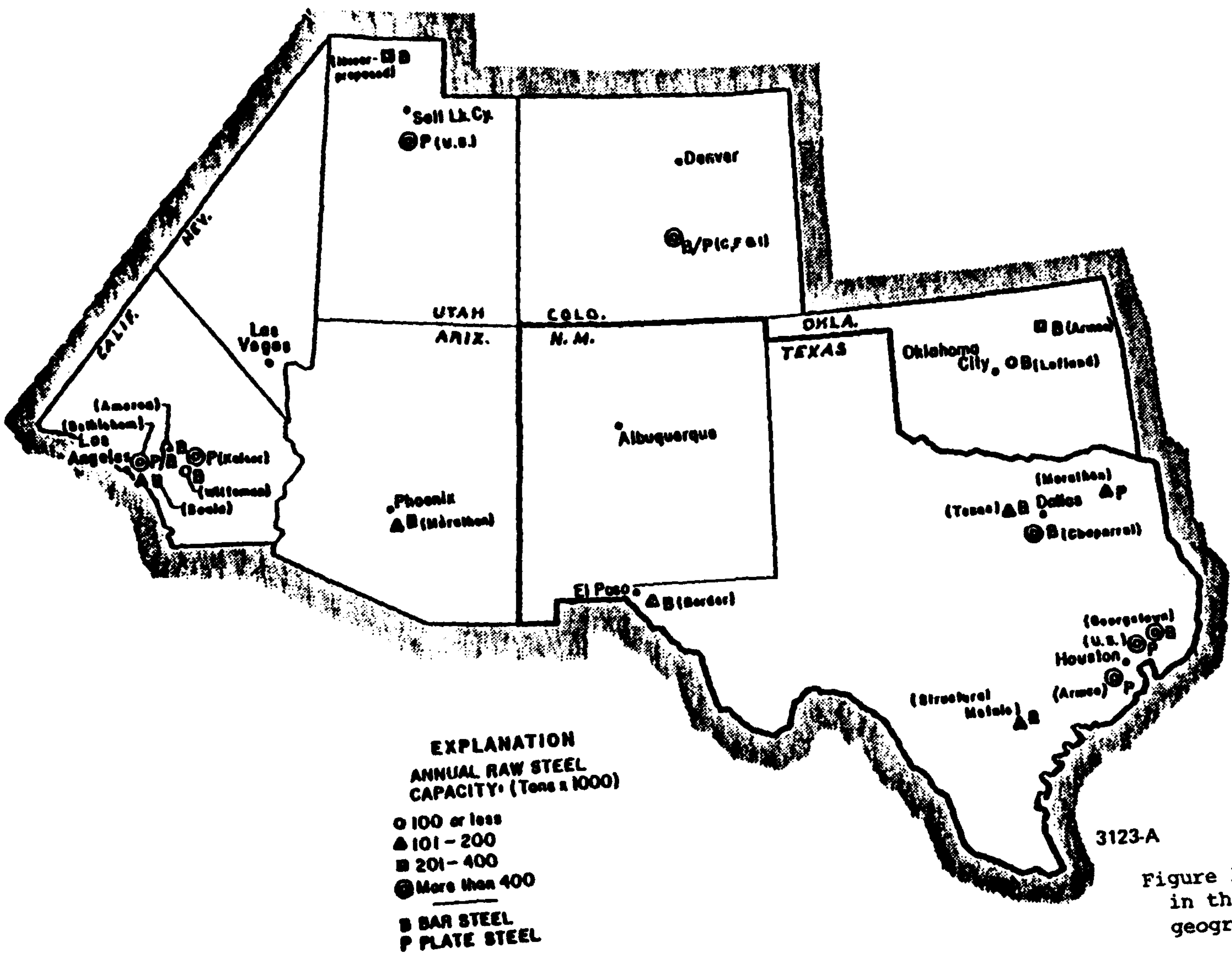

Figure 1-2. Steel plants in the Texas/New Mexico geographical market.

c. Judson Steel Corporation. Judson Steel is located near San Francisco, California and has an annual capacity of 120,000 tons of raw steel. Some 95 percent of its shipped product, or about 110,000 tons, is in the form of rebar.

d. Marathon Steel Company. Marathon Steel's plant is located at Tempe, Arizona. Raw steel capacity is 180,000 tons with a shipping capacity for rebars at 130,000 tons.

e. Soule Steel Company. Soule Steel has a plant at Carson, California near Los Angeles with a capacity to produce 120,000 tons of raw steel. If need be, it could ship 75,000 tons of rebar.

f. Bethlehem Steel Corporation. Bethlehem Steel has two plants well within range of the proposed missile site, one in Los Angeles and the other in Seattle. The plant in Los Angeles has a steelmaking capacity of 500,000 tons, while that in Seattle is somewhat larger with a capacity for 600,000 tons. Both plants produce substantial tonnages of rebar. Fifty percent of the shipments from the Los Angeles plant and 30 percent from the Seattle plant are rebar. Both plants also produce steel plate.

g. CF & I Steel Corporation. CF & I Steel Corporation has its plant at Pueblo, Colorado with an annual capacity of almost two million tons. It produces a wide variety of products including seamless pipe, rails, wire, structural members, and rebar. It could produce 250,000 tons of rebar in a year if demand called for it. CF & I stated that 150,000 tons of its rebar production capacity could be allocated to the M-X system construction without disrupting supply to its existing customers.

h. Nucor Corporation. Nucor Corporation operates three minimills at the present time. They are located in South Carolina, Texas, and Nebraska. There is a fourth mill in the initial construction stages at Plymouth, Utah. The Plymouth plant will have two 55 ton furnaces capable of producing between 350,000 and 400,000 tons of raw steel a year. A significant amount of this, at least 40 percent to possibly one half, could be in the form of rebar. Nucor will have an obvious freight advantage.

i. Ameron, Inc. Ameron's plant is located in Etiwanda, California and has an annual capacity of 160,000 tons. The plant does produce rebar although its average production of rebar is unavailable and is estimated to be approximately 64,000 tons.

j. Witteman Steel Mills. The Witteman Steel Mills is relatively small. The plant produces all rebar and has a capacity of 42,000 tons per year. The mill is located in Fontana, California.

k. U.S. Steel. U.S. Steel's Geneva plant located in Orem, Utah has a rated capacity of 2,500,000 tons. The plant does not produce rebar.

Producers located within economic transportation distance from the Texas/New Mexico site include d, e, f, g, h, i, j and k listed above. In addition, the following plants can provide additional capacity to the proposed Texas/New Mexico site:

l. Chaparral Steel. Chaparral Steel is located at Midlothian, Texas. This company has a current capacity to produce 400,000 tons of rebar. During the next three years, it will more than double its capacity through the addition of another furnace which will be in operation by 1983. This additional steel which will be used principally for structural products, while rebar steel will continue at about its present tonnage, although 25 to 35 thousand tons could readily be added if demand warranted.

m. Texas Steel Company. This company located in Fort Worth, Texas produces rebar and steel castings. Virtually 100 percent of its rolled output is in the form of rebar. Total raw steel capacity is 200,000 tons. Because of its location, it would be a likely supplier for the Texas/New Mexico location of the M-X system.

n. Structural Metals, Inc. This company has its plant at Seguin, Texas where one 50 ton furnace produces approximately 200,000 tons of raw steel a year. In addition, the company purchases billets and thus produces about 230,000 tons of rolled products. Rebar constitutes approximately 50 percent of the company's shipments or about 115,000 tons.

The company plans to install a 90 ton furnace which will be in operation by August of 1981, raising capacity to 360,000 tons of raw steel. At that time, the present 50 ton furnace will be kept in standby condition. As a result of the new furnace and additional capacity, rebar production will be expanded to about 150,000 tons.

o. Border Steel Rolling Mills, Inc. Border Steel, located in El Paso, Texas, has the capacity to produce 180,000 tons of steel annually. Approximately 72,000 tons would be in the form of rebar.

p. Georgetown Steel Co. Georgetown Steel, located in Beaumont, Texas, has a rated capacity of 650,000 tons. Approximately 130,000 tons is in the form of rebar.

q. Armco Steel Corporation. Armco has two plants with the Texas/New Mexico market area, one located in Houston has a capacity of 500,000 tons. The Houston plant produces steel plate but no rebar. The other located in Sand Springs, Oklahoma has an annual capacity of 310,000 tons. Its production is 83 percent rebar and 17 percent steel fencing posts.

r. U.S. Steel. U.S. Steel operates a plant in Baytown, Texas with an annual rated capacity of 1,500,000 tons. The Baytown plant produces steel plate but no rebar.

s. Marathon Le Tourneau Co. The Marathon plant, located in Longview, Texas, has an annual capacity of 100,000 tons. Marathon's principal product is steel plate. Rebar is not included in its product line.

t. Lofland Steel Mill, Inc. Lofland, located at Oklahoma City, produces all rebar. Its capacity is only 12,000 tons.

2. Reinforcing Bar Consumption. The Concrete Reinforcing Bar Institute estimates the amount of reinforcing bar consumption by end use on a regional basis. The consumption estimate is calculated by application of an average usage factor to the total amount of concrete used in each region of the United States. Table 1-5 sets forth the total estimated consumption of reinforcing bars in the eleven western states region and in the Texas, Oklahoma, Kansas, Nebraska, and western Missouri region from 1966 through 1978. From 1966 through 1978, the 11 western states consumed an average of 957,000 tons of reinforcing bars annually. The Texas, Oklahoma, Kansas, Nebraska, and western Missouri region consumed an annual average of 731,000 tons over the same period.

   The 1978 aggregate consumption of reinforcing bars for both regions was 54 percent of estimated rebar production capacity in those areas for that year.

3. Prices For Rebar And Steel Plate. The most universally available price data for individual commodities over an extended period is from the Bureau of Labor Statistics Producer Price Index detailed report. Prices for A-36 carbon steel plate and concrete reinforcing bars taken from this source are set forth in Tables 1-6 and 1-7 for the years 1964 through 1979. Specific price data for rebar were not published prior to December of 1976. We have therefore inputed the rebar price for periods prior to this date using the published price index. These prices have been graphically illustrated in Figure 1-3. It is evident from this illustration that the price of steel plate, largely a product of the major producers, has almost no downward flexibility while rebar, a relatively simple product which can be rolled from remelted scrap, is more responsive to changing market conditions and the competitive influence of smaller producers.

   The prices set forth are for the total United States. Regional prices for individual steel commodities over an extended period are not available.

Table 1-5. Apparent reinforcing bar consumption. 1966-1978

YEAR	ANNUAL CONSUMPTION: WASHINGTON, OREGON, CALIFORNIA, IDAHO, NEVADA, UTAH, ARIZONA, WYOMING, MONTANA, COLORADO, NEW MEXICO	ANNUAL CONSUMPTION: TEXAS, OKLAHOMA, KANSAS, NEBRASKA, WESTERN MISSOURI
	(TONS)	
	(1)	(2)
1966	1,092,000	484,000
1967	948,000	496,000
1968	1,028,000	501,000
1969	1,081,000	572,000
1970	1,123,000	566,000
1971	1,089,000	594,000
1972	926,000	610,500
1973	917,000	676.000
1974	1,021,800	644,900
1975	788,600	511,200
1976	684,700	548,000
1977	787,200	617,800
1978	950,300	631,000

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Source: Concrete Reinforcing Steel Institute.

Table 1-6. A-36 Carbon steel plate prices. 1964-1979

YEAR	DOLLARS PER TON												
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANNUAL AVERAGE
1964	$115.68	$115.68	$115.68	$115.68	$115.68	$115.68	$115.68	$115.68	$115.68	$115.68	$115.68	$115.68	$115.68
1965	115.68	115.68	115.68	115.68	115.68	116.42	116.42	116.42	116.42	116.42	116.42	116.42	116.11
1966	116.42	116.42	119.40	119.40	119.40	119.40	119.40	119.40	119.40	119.40	119.40	119.40	118.11
1967	119.40	119.40	119.40	120.14	120.40	120.40	120.40	120.40	122.39	123.32	124.38	124.38	121.20
1968	124.38	124.38	124.38	124.38	124.38	124.38	124.38	124.38	131.34	131.34	131.34	131.34	126.70
1969	131.34	131.34	131.34	131.34	131.34	131.34	138.30	138.30	138.30	138.30	138.30	138.30	134.82
1970	138.30	138.30	145.28	145.28	145.28	145.28	145.28	145.28	145.28	145.28	145.28	145.28	144.12
1971	145.28	145.28	157.22	157.22	157.22	157.22	157.22	172.14	172.14	172.14	172.14	172.14	161.45
1972	172.14	172.14	172.14	172.14	172.14	172.14	172.14	172.14	172.14	172.14	172.14	172.14	172.14
1973	179.10	179.10	179.10	179.10	179.10	179.10	179.10	179.10	179.10	179.10	179.10	179.10	179.10
1974	185.70	185.70	196.94	196.94	211.52	211.70	243.78	243.78	246.26	246.26	246.26	246.26	221.76
1975	259.94	259.94	259.94	259.94	259.94	259.94	254.96	253.72	253.72	267.16	267.16	267.46	260.32
1976	267.46	267.46	267.46	267.46	267.46	267.46	268.66	288.56	293.52	293.52	293.52	293.52	278.01
1977	293.52	293.52	293.52	293.52	293.52	293.52	313.42	313.42	313.42	313.42	313.42	313.42	303.47
1978	313.42	334.32	334.32	339.80	339.80	339.80	339.80	352.24	352.24	352.24	352.24	352.24	341.87
1979	368.16	368.16	368.16	368.16	378.50	381.08	381.08	381.08	381.08	400.00	400.00	400.00	381.29

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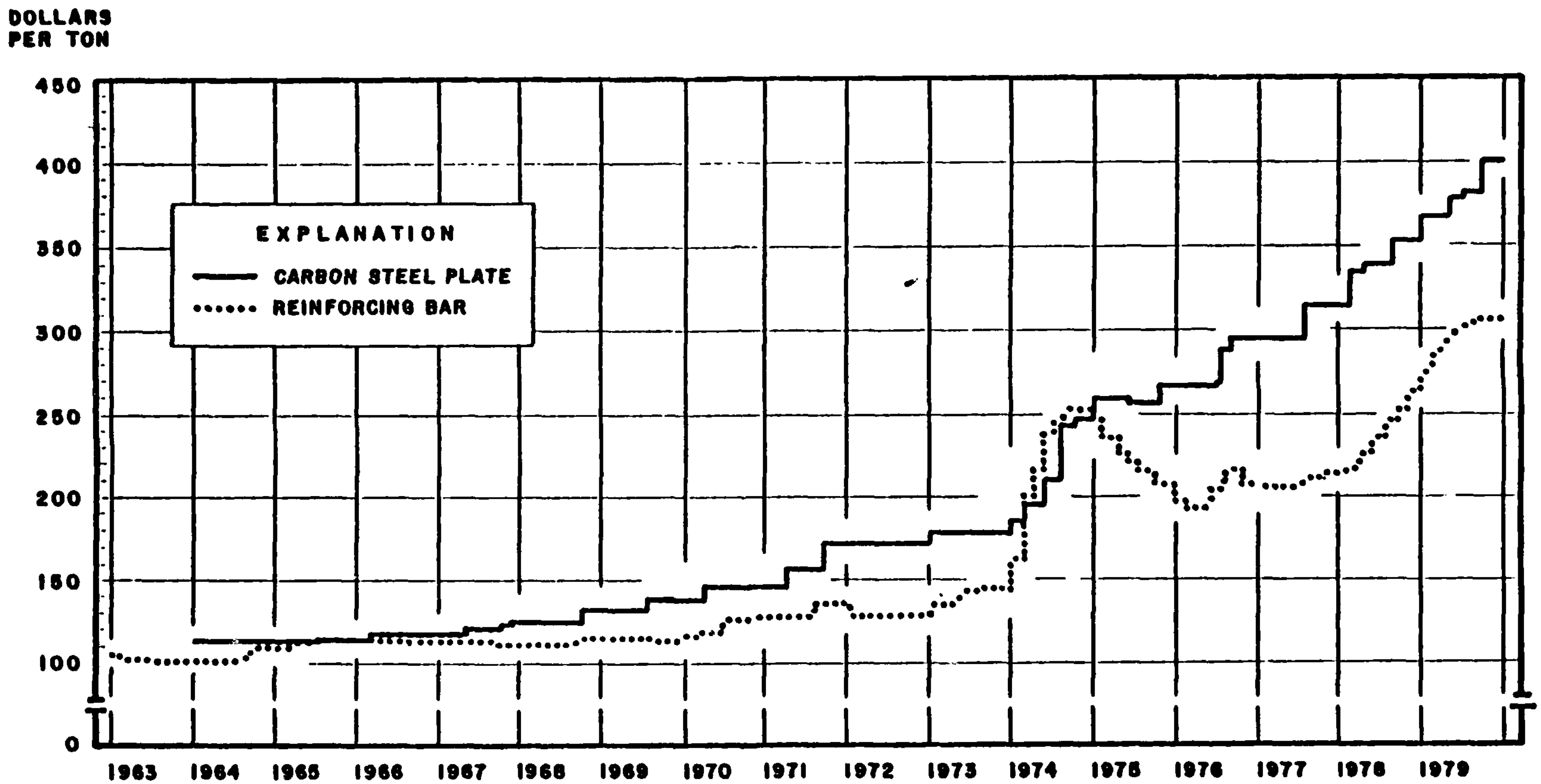
Source: *Producer Price Index*, U.S. Dept. of Labor, Bureau of Labor Statistics.

Table 1-7. Reinforcing bar prices[1]. 1963-1979

YEAR	DOLLARS PER TON												
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANNUAL AVERAGE
1963	$104.16	$103.33	$101.21	$101.21	$101.21	$101.21	$100.38	$100.38	$100.38	$100.38	$100.38	$100.38	$101.22
1964	100.38	100.38	100.38	100.38	100.38	100.62	101.68	103.22	107.82	109.23	109.23	109.23	103.58
1965	109.23	109.23	111.94	111.83	112.89	112.89	112.89	112.89	113.83	113.83	113.83	113.83	112.43
1966	113.83	113.83	113.83	113.83	113.83	112.89	112.89	112.89	112.89	112.89	112.89	112.89	113.28
1967	112.89	112.89	112.89	112.89	112.89	112.89	112.89	112.89	112.89	110.88	110.88	110.88	112.39
1968	110.88	110.88	110.88	110.88	110.88	110.88	110.88	110.88	111.94	112.89	112.89	112.89	111.47
1969	112.89	112.89	112.89	112.89	112.89	112.89	113.48	112.53	112.53	112.53	112.53	112.53	112.79
1970	116.07	117.25	118.55	118.55	118.55	122.56	126.57	126.57	126.57	126.57	126.57	128.59	122.75
1971	128.59	128.59	128.59	128.59	128.59	128.59	128.59	135.78	135.78	135.78	135.78	135.78	134.86
1972	132.18	128.59	128.59	128.59	128.59	128.59	128.59	128.59	128.59	128.59	128.59	128.59	128.70
1973	133.08	134.54	134.54	135.44	139.26	141.06	141.06	141.06	143.31	143.31	143.31	143.31	139.44
1974	160.62	163.43	199.40	215.47	237.16	239.19	243.23	247.39	252.90	252.90	252.90	252.90	226.46
1975	248.74	237.84	237.84	228.96	221.77	221.77	219.18	219.18	214.01	212.55	212.55	212.55	223.91
1976	207.60	197.60	191.53	191.53	201.98	206.37	206.37	211.54	213.56	213.56	208.36	208.36	204.86
1977	208.36	205.76	205.76	205.76	205.76	205.76	208.20	208.20	210.24	210.24	211.82	212.82	208.22
1978	212.16	214.54	217.40	221.72	226.32	230.94	233.02	237.14	243.12	252.66	257.30	261.78	234.01
1979	269.32	273.24	282.14	285.52	291.78	297.60	298.58	301.52	303.84	306.04	306.38	306.72	293.56

Source: *Producer Price Index*, U.S. Dept. of Labor, Bureau of Labor Statistics.

Note: Prices for January 1963 through October 1975 have been imputed using the wholesale price index for reinforcing bars (1967 = 100).



NET TRANSACTION PRICES, F.O.B. MILL.
SOURCE: PRODUCER PRICE INDEX, U.S. DEPT. OF LABOR, BUREAU OF LABOR STATISTICS.

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Figure 1-3. Selected steel prices, 1963-1979.

2.0 PRICE IMPACT ON STEEL PRODUCTS ASSOCIATED WITH THE CONSTRUCTION OF THE M-X SYSTEM

The construction of the M-X system will require a substantial quantity of steel, generally in the form of rebar and/or steel plate.

The impacts on the price of steel were examined relative to the three alternate basing proposals or scenarios. The first proposal discusses the impacts under a Nevada/Utah based M-X system. The Nevada/Utah market area evaluation encompassed the following western states: Arizona, California, Colorado, Idaho, Montana, Oregon, Nevada, New Mexico, Utah, Washington, and Wyoming. At the present time, the states of Idaho, Montana, Nevada, New Mexico, and Wyoming do not have steel producing plants.

The second basing proposal concerns the impact of a Texas/New Mexico based system. The Texas/New Mexico market area evaluation encompassed the states of Texas, Oklahoma, Colorado, New Mexico, Arizona, Utah, and the southern portions of California and Nevada.

The impact under a split-basing proposal would include both market areas.

To prepare a model, two demand options were created. These options involve different mixes of steel requirements. As M-X requirements become more clearly defined, the resulting model can be applied. The model, rather than the demand estimates, is the key element of this analysis.

The steel requirements under option 1 indicate that the construction of the M-X system would require 1,180,000 tons of steel, of which approximately 98 percent would be concrete reinforcing bar (rebar), over an eight year period from 1982 through 1989. Peak year requirements are expected to occur in 1987 when 259,000 tons of steel will be required.

Under option 2, total steel requirements would be 1,200,000 tons over an eight year period. The significant difference between option 1 and option 2 is the relative amount of rebar required. Under option 1, rebar requirements would total 1,160,000 tons compared to 790,000 tons under option 2. Under option 1, the largest demand for rebar in any one year for the M-X project is 255,000 tons in 1987 and the second largest annual requirement is 243,000 tons in 1986. If the second option using less rebar is adopted, the demand will be substantially diminished reaching a high point of 173,000 tons in 1987 with the other years dropping far below this figure.

If the M-X system is split between the Nevada/Utah location and the Texas/New Mexico location, it is assumed that the requirements for concrete reinforcing bar at each location would be approximately half of that stated for either single location. Thus, the largest tonnage of rebar needed in any one year for each location would be 130,000 tons, and in number of years the total would be under 100,000 tons. This amount could be readily supplied by the producers above.

In order to assess the impact of the reinforcing steel requirements for each possible site of the M-X system, we have made several comparisons. Table 2-1 sets forth the percentage of 1978 reinforcing bar consumption which would be required for construction of the M-X system in each of the years 1982 through 1989. Under

Table 2-1. Proposed M-X system reinforcing bar requirements as a percentage of 1978 consumption.

YEAR	PERCENT OF 1978 REINFORCING BAR CONSUMPTION					
	NEVADA/UTAH SITE		TEXAS/NEW MEXICO SITE		COMBINED SITES	
	OPTION 1	OPTION 2	OPTION 1	OPTION 2	OPTION 1	OPTION 2
1982	2.4	1.7	2.2	1.5	1.6	1.1
1983	7.3	5.0	6.6	4.5	4.7	3.2
1984	12.2	8.3	11.0	7.5	7.8	5.3
1985	15.9	10.8	14.3	9.8	10.1	6.9
1986	25.6	17.5	23.1	15.8	16.4	11.1
1987	26.9	18.3	24.2	16.5	17.1	11.7
1988	20.8	14.1	18.7	12.8	13.2	9.0
1989	11.0	7.5	9.9	6.8	7.0	4.8

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option 1, the requirement ranges from a low of 1.6 percent of 1978 consumption for the start-up year of 1982 if a split-basing proposal is accepted to a high of 26.9 percent of 1978 consumption in the peak construction requirement year of 1987 if the Nevada/Utah site is selected. Under option 2 which requires less reinforcing steel, the low point requirement is 1.1 percent and the high is 18.3 percent.

Under option 1, the Nevada/Utah site would require an average annual amount of reinforcing bar steel equal to 15.3 percent of total 1978 rebar consumption in the combined 11 western states. The Texas/New Mexico site would require an average annual amount of reinforcing bar steel equal to 14.5 percent of the total 1978 rebar consumption in the States of Oklahoma, Texas, Colorado, New Mexico, Arizona, Nevada, Utah, and southern California combined. Under a split-basing proposal, the average annual M-X requirement would be 10.1 percent of the total 1978 reinforcing bar consumption in the 11 western states plus Texas and Oklahoma.

Under option 2, the average annual rebar requirement would equal 10.4 percent of total 1978 rebar consumption in the Nevada/Utah market; 9.9 percent of total 1978 rebar consumption in the Texas/New Mexico market; or 6.9 percent of total 1978 rebar consumption in both markets combined.

During 1978 the steel industry produced at 85.9 percent of its overall capacity. For the geographical markets surrounding the two proposed M-X basing sites, however, 1978 reinforcing bar consumption for the 11 western states plus Texas and Oklahoma was estimated to be only 54 percent of reported rebar production capacity.

A more significant comparison between the M-X system requirements and stated 1979 rebar production capacity (including proposed expansions) is set forth in Table 2-2. This comparison shows that the M-X system will require from a low of 0.5 percent of the total rebar production capacity under a split-basing proposal in the start-up year of 1982 to a high of 15.4 percent for the Nevada/Utah proposal in the peak year of 1987. If the Texas/New Mexico site is chosen, the maximum capacity utilization which would be allocated to rebar for the M-X system would be 11.4 percent. Under a split-basing proposal, the maximum would be 8.8 percent.

The extent of the impact could be reduced by purchasing reinforcing bars ahead of their scheduled usage date. If this is done, the amount purchased in any given year would be the average annual requirement. Under option 1, the average annual requirement would be 145,000 tons. Under option 2, the average annual requirement would be 98,750 tons. For the Nevada/Utah site these amounts would require utilization of 8.8 percent of the rebar production capacity under option 1 or 6.0 percent under option 2. For the Texas/New Mexico site the requirement would be 6.5 percent and 4.4 percent for options 1 and 2, respectively. Under a split-basing proposal, the annual capacity utilization requirements would be 5.0 percent for option 1 or 3.4 percent for option 2.

The previous two comparisons were made using the assumption that no additional capacity for rebar production would be added either through plant expansion or diversion of rated capacity from other steel products. A more likely occurrence would be for steel plants which already have reinforcing bar production equipment to increase their output of rebar in relation to products having less demand or unused production capacity. This conclusion is supported by the

Table 2-2. Proposed M-X system steel reinforcing bar requirements as a percentage of 1979 rebar production capacity. 1982-1989

YEAR	PERCENT OF 1979 REBAR PRODUCTION CAPACITY					
	NEVADA/UTAH SITE		TEXAS/NEW MEXICO SITE		COMBINED SITES	
	OPTION 1	OPTION 2	OPTION 1	OPTION 2	OPTION 1	OPTION 2
1982	1.4	1.0	1.0	0.7	0.8	0.5
1983	4.2	2.9	3.1	2.1	2.4	1.6
1984	7.0	4.8	5.2	3.5	4.0	2.7
1985	9.1	6.2	6.7	4.6	5.2	3.5
1986	14.7	10.0	10.9	7.4	8.4	5.7
1987	15.4	10.5	11.4	7.8	8.8	6.0
1988	11.9	8.1	8.8	6.0	6.8	4.6
1989	6.3	4.3	4.7	3.2	3.6	2.4

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conversations we have had with various managers and other personnel of steel mills located throughout the Nevada/Utah and Texas/New Mexico markets. We were informed that CF & I, Border Steel, Chaparral, Armco Steel, and several others would increase their production of rebar if demand warranted it. We have therefore made an additional comparison between the M-X system reinforcing bar steel requirements and the total raw steel production capacity of those mills presently producing reinforcing bars. This comparison is set forth in Table 2-3. The M-X system would utilize total raw steel production capacity from a low of 0.2 percent under option 2 for split-basing in the start-up year of 1982 to a high of 5.6 percent during the peak year 1987 if option 1 and the Nevada/Utah site are chosen.

For option 1 at the Nevada/Utah site the average annual usage of reinforcing bars would require allocation of 3.2 percent of the total raw steel production capacity for reinforcing bar producers in the 11 western states. Option 2 at the Nevada/Utah site would require an average annual capacity utilization from the same plants of 2.2 percent.

If the Texas/New Mexico site is chosen, average annual reinforcing bar requirements would use 2.5 percent of total raw steel production capacity of reinforcing bar producers in the Texas/New Mexico market area under option 1 and 1.7 percent under option 2.

A split-basing proposal using option 1 would require 2.0 percent of the combined raw steel production capacity of all reinforcing bar producers in the states of Washington, Oregon, California, Utah, Arizona, Colorado, Oklahoma, and Texas (other states within the combined market areas have no reinforcing bar producers). Under option 2, 1.4 percent of the combined raw steel production capacity of these producers would be used.

Table 2-4 sets forth the incremental tonnage of reinforcing bar production which is associated with each 1 percent increase in capacity utilization.

A. Steel Plate Price Impact

The price of major steel mill products is a function of the capital and financing structure of the steel industry rather than demand shifts for any particular product or group of products. Prices are determined insofar as possible by application of a target rate of return to overall production costs. Steel plate required for construction of the proposed M-X missile system would be a maximum of 91,000 tons in any one year. This amount represents only 0.85 percent of the raw steel capacity of the steel production facilities located within the 11 western states and only 0.55 percent of the raw steel capacity of the 11 western states plus Texas and Oklahoma. The addition of this small increase in demand would have no impact on the price of steel plate given the existing pricing structure of the steel industry and their present capacity utilization rate.

B. Steel Reinforcing Bars

The price of steel reinforcing bars is more subject to changing market conditions and competitive influences than are the principle products of the major steel producers. The production of rebar requires a smaller capital investment and can be engaged in by small "minimills." One such producer within the geographic

Table 2-3. Proposed M-X system steel reinforcing bar requirements as a percentage of 1979 raw steel production capacity.[1]

YEAR	PERCENT OF 1979 RAW STEEL PRODUCTION CAPACITY					
	NEVADA/UTAH SITE		TEXAS/NEW MEXICO SITE		COMBINED SITES	
	OPTION 1	OPTION 2	OPTION 1	OPTION 2	OPTION 1	OPTION 2
1982	.5	.4	.4	.3	.3	.2
1983	1.5	1.0	1.2	.8	1.0	.7
1984	2.5	1.7	2.0	1.3	1.6	1.1
1985	3.3	2.3	2.6	1.8	2.1	1.5
1986	5.3	3.6	4.2	2.8	3.4	2.3
1987	5.6	3.8	4.4	3.0	3.6	2.5
1988	4.3	2.9	3.4	2.3	2.8	1.9
1989	2.3	1.6	1.8	1.2	1.5	1.0

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[1]Includes only those steel plants presently producing reinforcing bars.

Table 2-4. Total steel reinforcing bar production associated with a one percent increase in capacity utilization. 1979

SITE	REBAR PRODUCTION CAPACITY (TONS) 1	RAW STEEL PRODUCTION CAPACITY (TONS) 2
Nevada/Utah	16,560	45,620
Texas/New Mexico	22,370	58,640
Both Sites	29,070	70,740

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range of the proposed Nevada/Utah basing site is Witteman Steel with raw steel capacity of only 42,000 tons. These small producers make rebar from remelted scrap steel. The impact of changes in the market is due to variance in the cost of steel scrap, the principal input used, rather than changes in the demand for rebar as an end product. Whenever the overall demand for steel products increases, large steel producers increase the proportion of steel scrap used in their production facilities to meet the increased demand over the short term. If the increased demand persists, new capacity will be added and the pressure on scrap markets subsides. During the period of high scrap usage, the reduced supply causes the price to rise. A subsequent decline can be expected when demand declines and supply increases.

We have attempted to quantify the price impacts on rebar associated with the construction of the M-X system. Unfortunately, several problems precluded the development of a regional model to forecast price impacts.

The first and foremost problem is the availability of data. Although data pertaining to rebar consumption are available on a regional basis, corresponding price information is not. After discussions with the Concrete Reinforcing Steel Institute and the American Iron and Steel Institute, we determined that reliable and historical regional pricing information on rebar is unavailable.

With the unavailability of rebar prices on a state or regional basis, we chose to examine the rebar industry nationwide.

After numerous regressions utilizing different combinations of pertinent variables, we determined that the most reliable approach would be to estimate the price impact on rebar through the use of the following variables: (1) price of rebar, (2) scrap steel prices, (3) capacity utilization, and (4) time.

The equations were estimated in the following manner:

$$X_1 = a + bX_2 + c\text{Time} + dX_3 \qquad R^2 = 0.76$$
$$X_3 = e + fX_1 + gX_2 + h\text{Time} \qquad R^2 = 0.87$$

Where: X_1 = rebar prices in 1972 dollars
X_2 = capacity utilization of rebar producing plants
X_3 = scrap steel prices in 1972 dollars
Time = time variable

The estimated coefficients and their respective "t" statistics are set forth in Table 2-5. The coefficients were all significantly different from zero at a 5 percent level of significance with the exception of the time variable. The R^2 values were 0.76 and 0.87 for the respective equations stipulating rebar prices and scrap prices as the dependent variables. The Durbin-Watson statistic (2.28) for the first equation indicated that no autocorrelation existed. The scrap steel equation's test for autocorrelation was inconclusive.

The estimated equations were regressed in natural logs, thus setting forth the coefficients in percentage change form with the exception of the time variable.

The estimated equation expressing scrap steel as the dependent variable suggests that when capacity utilization is increased by 1 percent the price of scrap

Table 2-5. Rebar industry estimated equation.

	ESTIMATED COEFFICIENTS (1)	"t" STATISTICS (2)
a	6.0913	—
b	- .60118	(-2.13) [1]
c	- .013512	(-1.70) [2]
d	.44404	(4.67) [1]
e	-10.677	—
f	1.5934	(4.67) [1]
g	1.3875	(1.98) [1]
h	.039732	(3.57) [1]

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[1]Significantly different from zero at a 5 percent level of significance.

[2]Significantly different from zero at a 10 percent level of significance.

Note: Significance computed under a one-tailed test.

steel increased by approximately 1.3875 percent. The estimated equation expressing rebar prices as the dependent variable indicates that a 1 percent increase in scrap steel prices results in a 0.4404 percent increase in the price of rebar. The rebar price equation also indicates that as capacity utilization increases by 1 percent, rebar prices should fall by 0.60118 percent (see Table 2-5).

The operational form of the equation is set forth below:

$$X_1 = \frac{a = bX_2 + cTime + de + dgX_2 + dhTime}{1 + df}$$

The model indicates that demand increases which are met by increased capacity utilization of a rebar producing plant generally result in an upward movement in scrap steel prices. Logically, as capacity utilization increases, the demand for all inputs including scrap steel would increase, forcing prices up. We have chosen to use only the scrap steel input in the model since it has the most significant impact on rebar prices. The model shows that price increases in scrap steel result in an associated increase in the price of the finished product (rebar). In addition, the model indicates that historically, as the capacity utilization of a plant increases, the price of the product declines, mitigating the initial price increase associated with rising input costs.

Using the above model, the impact on the price of rebar can be estimated indirectly by examination of the increased capacity utilization needed to meet the demand of the M-X system.

The price impact is based on the following assumptions:

1. The behavior at the national level represents the general nature of the regional markets for the Nevada/Utah and Texas/New Mexico sites.

2. The historical structure of the rebar industry will not change.

Based upon these assumptions, we have made estimates of the proposed M-X system's impact on rebar prices.

Table 2-6 sets forth the expected annual percentage increases in raw steel capacity utilization which will be needed to supply rebar for construction of the M-X system. The Nevada/Utah site, which presently has the smallest amount of rebar consumption for the three siting proposals under consideration, would experience the greatest percentage increases in capacity utilization. An initial increase in capacity utilization of 2.4 percent for option 1 or 1.7 percent for option 2 will be required during the start-up year of 1982 if the Nevada/Utah site is selected. The maximum single year increase in capacity utilization for the Nevada/Utah site would occur during the fifth year of construction when an increase of either 9.8 percent for option 1 or 6.7 percent for option 2 would be needed.

The annual increases in capacity utilization which would be required under the Texas/New Mexico proposal are almost the same as those for Nevada/Utah. Peak year capacity increases for Texas/New Mexico would be 9.3 percent for option 1 or 6.3 percent for option 2. The capacity utilization requirements for the two sites combined are of course lower. Under a combined site proposal, the start-up year

Table 2-6. Estimated annual increase in raw steel capacity utilization needed to supply rebar for the proposed M-X system. 1982-1989

YEAR	ANNUAL PERCENTAGE INCREASE					
	NEVADA/UTAH SITE		TEXAS/NEW MEXICO SITE		COMBINED SITES	
	OPTION 1 (1)	OPTION 2 (2)	OPTION 1 (3)	OPTION 2 (4)	OPTION 1 (5)	OPTION 2 (6)
1982	2.4	1.7	2.3	1.6	1.6	1.1
1983	4.9	3.3	4.6	3.2	3.2	2.2
1984	4.9	3.3	4.6	3.2	3.2	2.2
1985	3.7	2.5	3.5	2.4	2.4	1.6
1986	9.8	6.7	9.3	6.3	6.5	4.4
1987	1.2	.8	1.2	.8	.8	.5
1988	(6.1)	(4.2)	(5.8)	(3.9)	(4.0)	(2.7)
1989	(9.8)	(6.7)	(9.3)	(6.3)	(6.5)	(4.4)

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would require an increase in capacity utilization of 1.6 percent for option 1 or 1.1 percent for option 2. Peak year requirements would be 6.5 percent or 4.4 percent for options 1 and 2, respectively.

Using the coefficients from our steel reinforcing bar price model equation, we have translated the required annual increases in capacity utilization into estimates for the expected percentage changes in reinforcing bar prices which can be expected due to the increased production.

Expected reinforcing bar price increases for each year from 1982 through 1989 are set forth in Table 2-7. These estimates indicate that the construction of the M-X system under option 1 in either market area would result in price increases ranging from 0.1 percent in 1982 to 0.5 percent in 1986. No price impact has been estimated to occur in 1988 or 1989 because as the demand for rebar decreases, scrap steel prices would also decline as would capacity utilization resulting in a price decline. For our purposes we have assumed that overall prices will not fall and have therefore shown any downward impact as zero.

Under the less rebar intensive option 2, price increases are estimated to range from 0.1 percent in 1982 to 0.3 percent in 1986. With a split-basing system, impacts would be virtually insignificant. The largest price increase in any given year would approximate 0.3 percent under option 1 and 0.2 percent under option 2.

Table 2-8 sets forth the cumulative increase in rebar prices associated with the construction of the M-X system. Under a Nevada/Utah site with the require ments set forth in option 1, the cumulative price increase would total approximately 1.4 percent by 1987. Under option 2, the cumulative price increase will be less than 1 percent.

With construction of the system in the Texas/New Mexico area, the cumulative price impact would reach a high of 1.3 percent in 1987 under option 1 and 0.9 percent under option 2.

If the M-X system is split-based, the cumulative impact would be less than 1 percent under either option.

The estimated impacts set forth above are estimates based on the inherent assumptions discussed earlier. Variation from those assumptions would alter the estimates determined. For example, if the level of capacity utilization increases due to increased demand in the overall economy, the relative price impact which will be attributable to the M-X system would decline. Alternatively, a decline in economic activity resulting in lower capacity utilization would transfer a relatively larger proportion of price impact to the M-X. In either such case, however, the overall price impact associated with construction of the proposed M-X system is not significant and would probably vary by no more than 1 percent.

There are, of course, additional variables of lesser significance than those used in our model which can have an impact on the general price level of steel reinforcing bars. Some are more psychological than economic in nature. We have therefore examined in a more subjective analysis other indications of the probable impact of the M-X system on steel reinforcing bar prices.

Table 2-7. Estimated annual increase in steel reinforcing bar prices due to increased capacity utilization needed to supply rebar for the proposed M-X system. 1982-1989

YEAR	ANNUAL PERCENTAGE INCREASE					
	NEVADA/UTAH SITE		TEXAS/NEW MEXICO SITE		COMBINED SITES	
	OPTION 1 (1)	OPTION 2 (2)	OPTION 1 (3)	OPTION 2 (4)	OPTION 1 (5)	OPTION 2 (6)
1982	.1	.1	.1	.1	.1	.1
1983	.2	.2	.2	.2	.2	.1
1984	.2	.2	.2	.2	.2	.1
1985	.2	.1	.2	.1	.1	.1
1986	.5	.3	.5	.3	.3	.2
1987	.1	.0	.1	.0	.0	.0
1988[1]	.0	.0	.0	.0	.0	.0
1989[1]	.0	.0	.0	.0	.0	.0

3546

[1]Assumes no downward price flexibility.

Table 2-8. Cumulative expected increase in steel reinforcing bar prices due to increased raw steel capacity utilization needed to supply rebar for the proposed M-X system. 1982-1989

YEAR	PERCENT INCREASE ABOVE 1978 PRICE					
	NEVADA/UTAH SITE		TEXAS/NEW MEXICO SITE		COMBINED SITES	
	OPTION 1	OPTION 2	OPTION 1	OPTION 2	OPTION 1	OPTION 2
1982	.1	.1	.1	.1	.1	.1
1983	.4	.3	.4	.2	.2	.2
1984	.6	.4	.6	.4	.4	.3
1985	.8	.6	.8	.5	.5	.4
1986	1.3	.9	1.2	.8	.9	.6
1987	1.4	.9	1.3	.9	.9	.6
1988[1]	1.4	.9	1.3	.9	.9	.6
1989[1]	1.4	.9	1.3	.9	.9	.6

3547

[1]Assumes no downward price flexibility.

As set forth earlier, in 1978 rebar consumption was estimated to be approximately 54 percent of rebar capacity. This would indicate a substantial potential for increasing rebar production if demand warrrants such action. With substantial capacity available, increased demand of the magnitude associated with the construction of the M-X system would not cause a strain on rebar producing plants.

Under the more rebar intensive option 1, the 1987 peak year requirement of 255,000 tons represents approximately 15.4 percent of the current rebar production capacity in the Nevada/Utah market. The 1987 peak year requirement represents 11.4 percent of the current rebar production capacity of the Texas/New Mexico market area. Under a split-basing proposal, the 1987 peak year requirement would represent only 8.8 percent of the rebar production capacity. As set forth in Table 2-4, a 1 percent increase in capacity utilization would result in an increase in production of 16,560 tons for plants in the Nevada/Utah area and 22,370 tons for plants within the market area of Texas/New Mexico.

Given the present rebar capacity utilization of 54 percent, the peak year requirement for steel rebar to serve the proposed M-X construction would increase the total utilization of capacity by 15.4 percent to approximately 70 percent. This figure is still below optimum operating levels. Even if capacity utilization were at a high level, increased demand for rebar associated with the M-X system could be met by altering the mix of products produced at rebar producing plants. If demand warranted such behavior, rebar producing plants in the West could shift their production or increase their raw steel capacity utilization by 5.6 percent in order to meet the 1987 peak year requirement for a Nevada/Utah bases system. For a Texas/New Mexico based system, production or raw capacity utilization would have to increase by 4.4 percent. Under a split-basing proposal, the needed increase would be 3.6 percent to meet the 1987 peak year requirement.

After discussions with the management of several rebar producing plants, the indication was that the production of rebar was dependent on the estimated demand. If demand warrants increased production, the ability to produce additional rebar is available. Within the range of current rebar production capacity, steel producers contacted anticipate that no variation from present prices will be made because of increasing demand.

The general consensus among producers is that due to the present depressed market for reinforcing steel and ever increasing pressure from foreign steel producers, a substantial increase in the demand for steel reinforcing bars would be welcome. Discussions with CF & I Steel Corporation located in Pueblo, Colorado indicated that their plant alone could supply up to 150,000 tons of rebar annually for construction of the M-X system with no effect on current customers.

We conclude that the steel requirements associated with the M-X system would have little, if any, impact on steel rebar prices.

REFERENCES

Prices and Costs in the United States Steel Industry, Executive Office of the President, Council on Wage and Price Stability, October 1977.

A Study of Steel Prices, Executive Office of the President, Council on Wage and Price Stability, July 1975.

The Wall Street Journal, June 10, 1980, p. 7.

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